Mercury Programs Update

State Water Resources Control Board

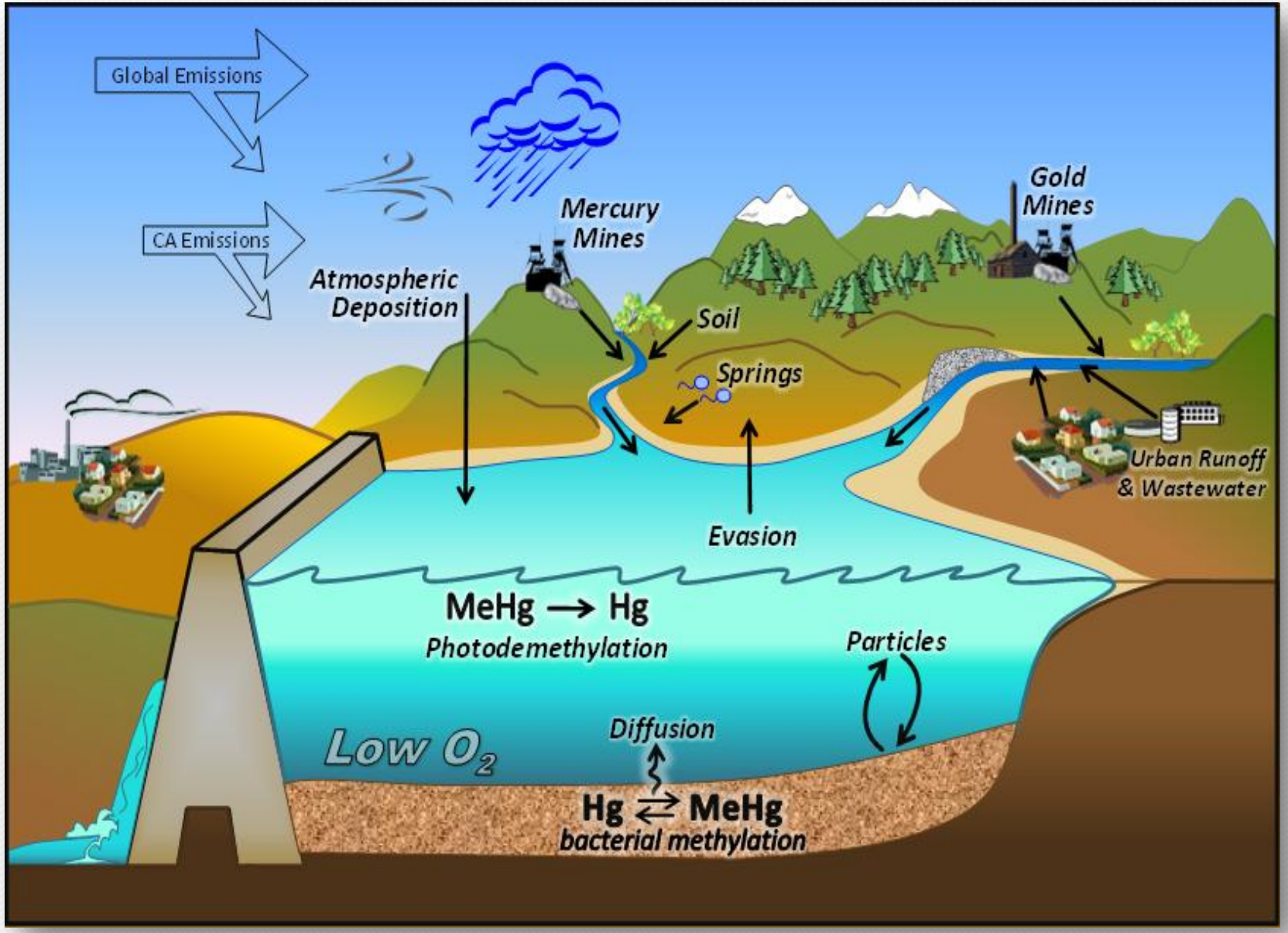
April 23, 2012 Board Meeting

Item # 4

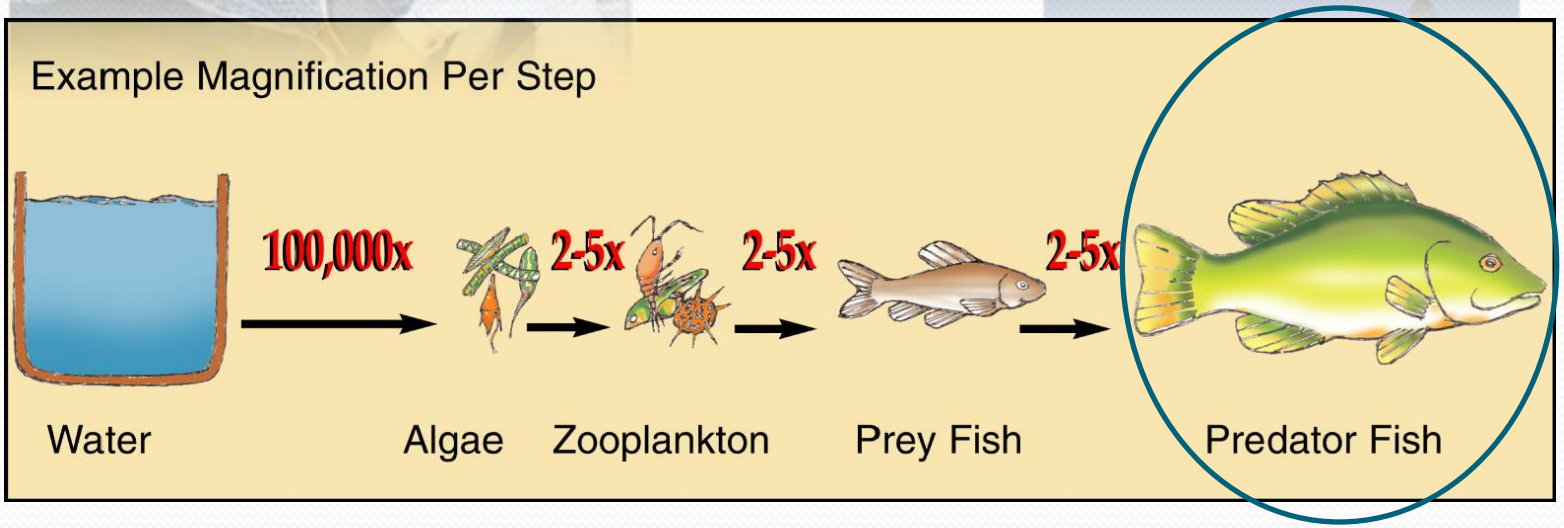
Today's Agenda

- Introduction to mercury
- Central Valley Water Board mercury TMDLs
- San Francisco Bay Water Board mercury TMDLs
- Statewide Mercury Program for Inland Surface Waters, Enclosed Bays and Estuaries
  - Control Program for Mercury Impaired Reservoirs
  - Methylmercury Fish Tissue Objectives and Implementation
  - Tribal Fish Consumption Study

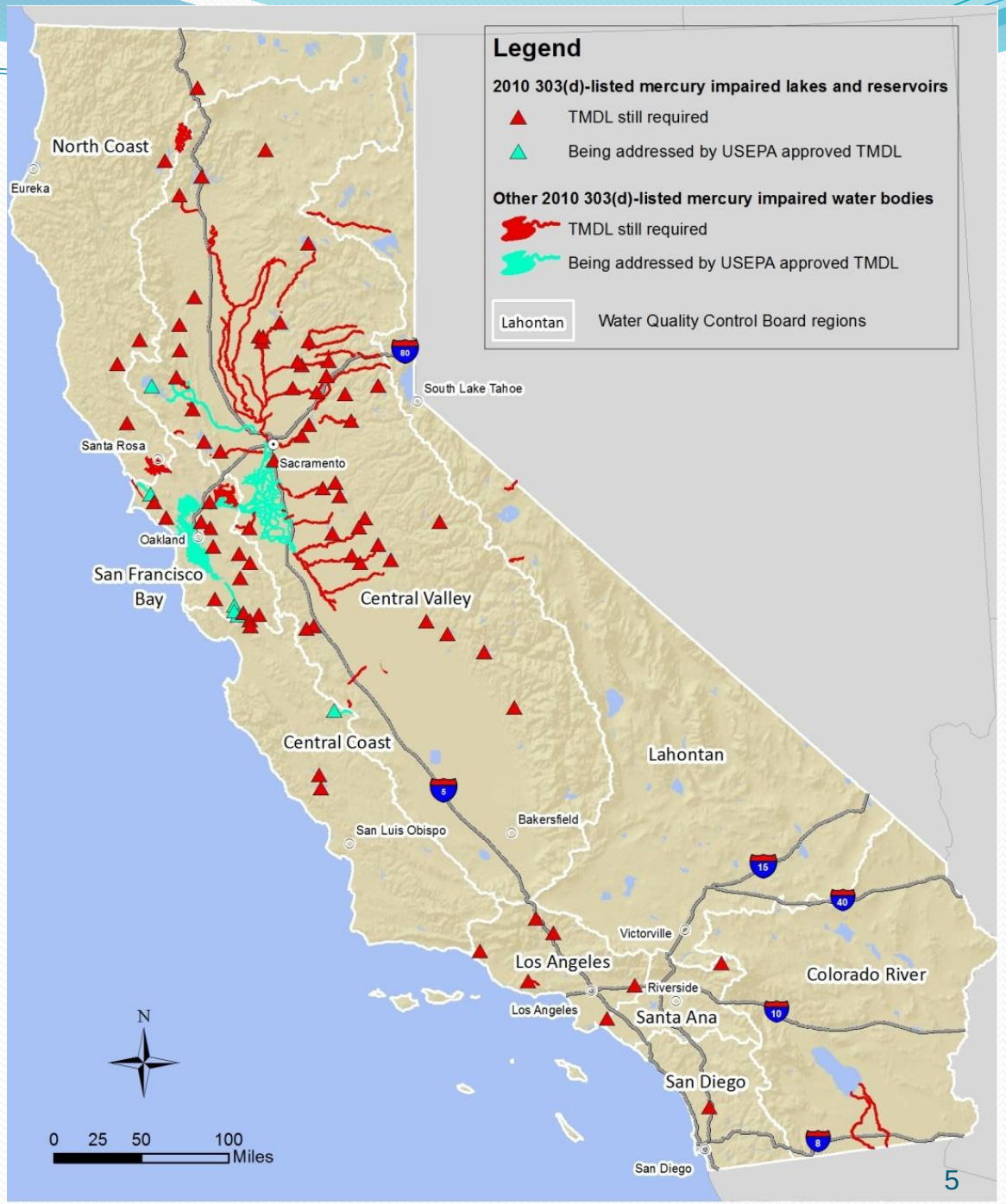
Sources and Methylation of Mercury



Methylmercury Bioaccumulation



Mercury-impaired waters



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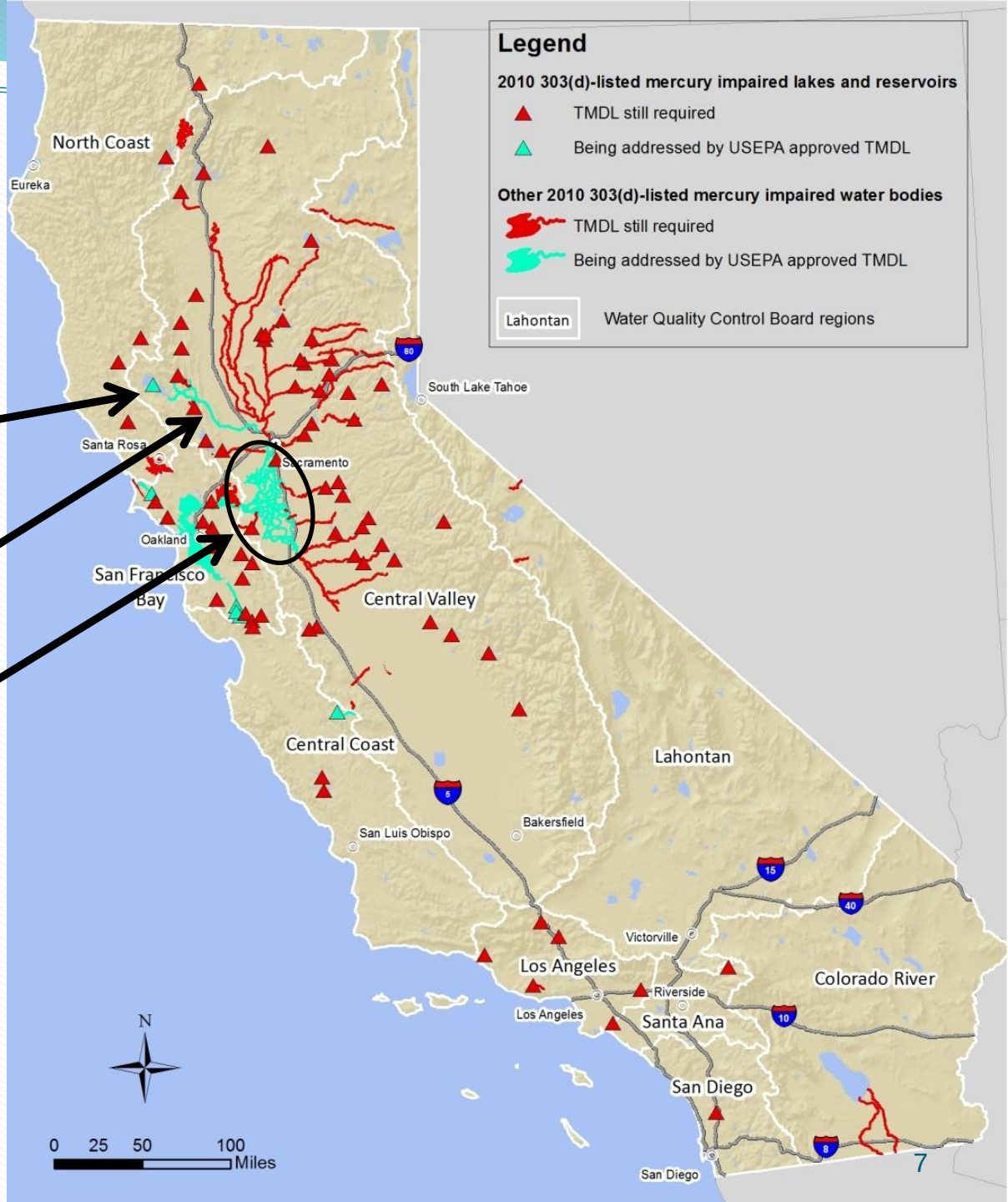
RB5 Mercury TMDLs

Clear Lake 2003

Cache Creek Watershed 2005

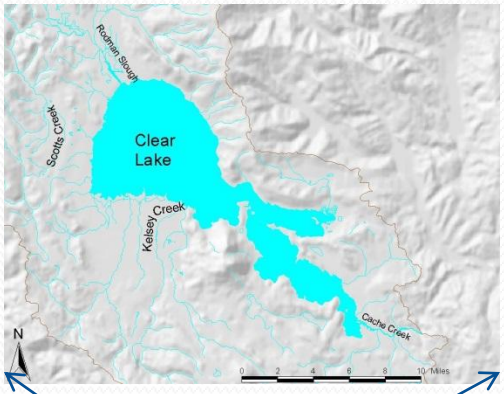
Delta 2010

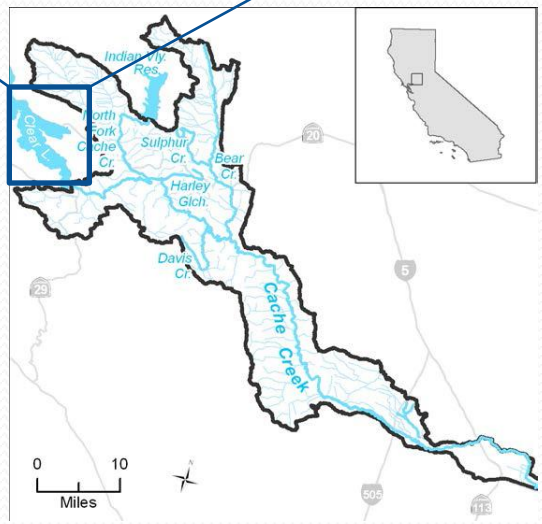
Currently, 80 additional water bodies on the 303(d) list



Clear Lake and Cache Creek TMDLs

- First water quality objective for methylmercury in fish in California
- Focused on inorganic mercury control:
  - Mine remediations
  - Erosion control





Clear Lake and Cache Creek TMDLs

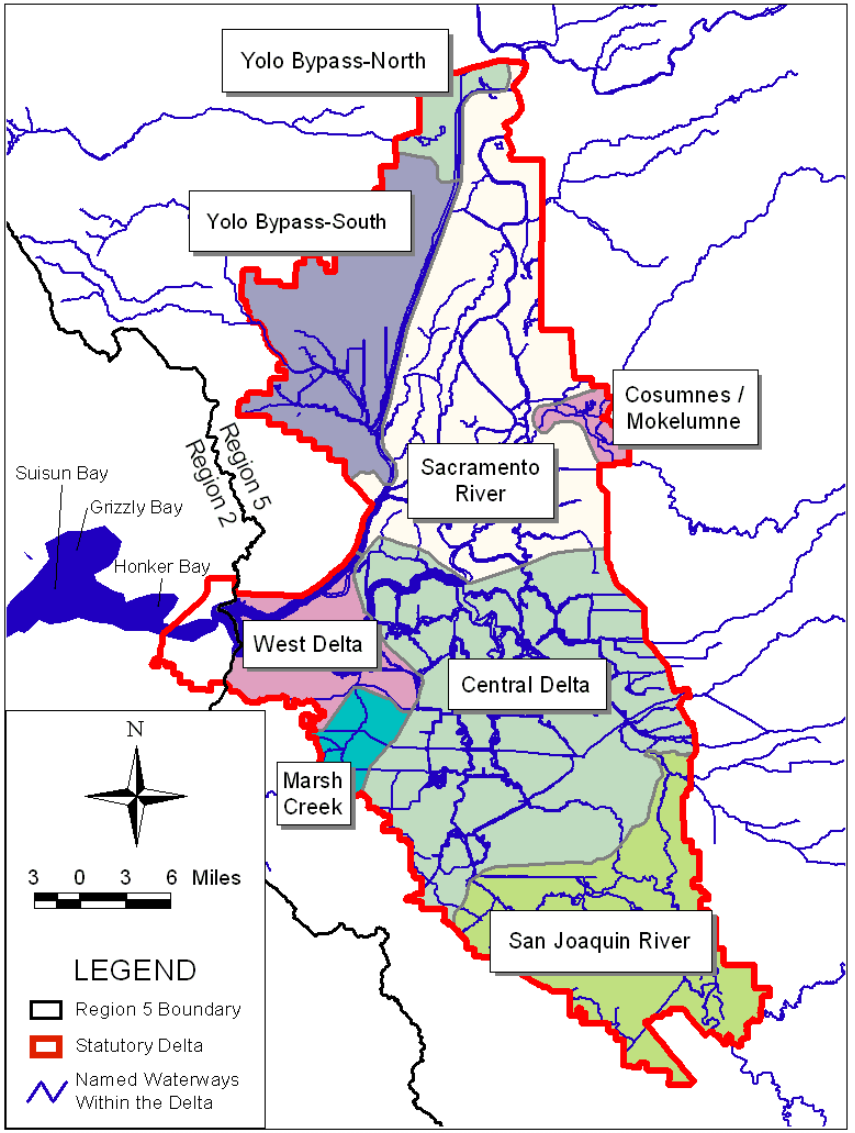
- Sulphur Bank Mine

- Abbott and Turkey Run mines

  18,000 kg mercury contained

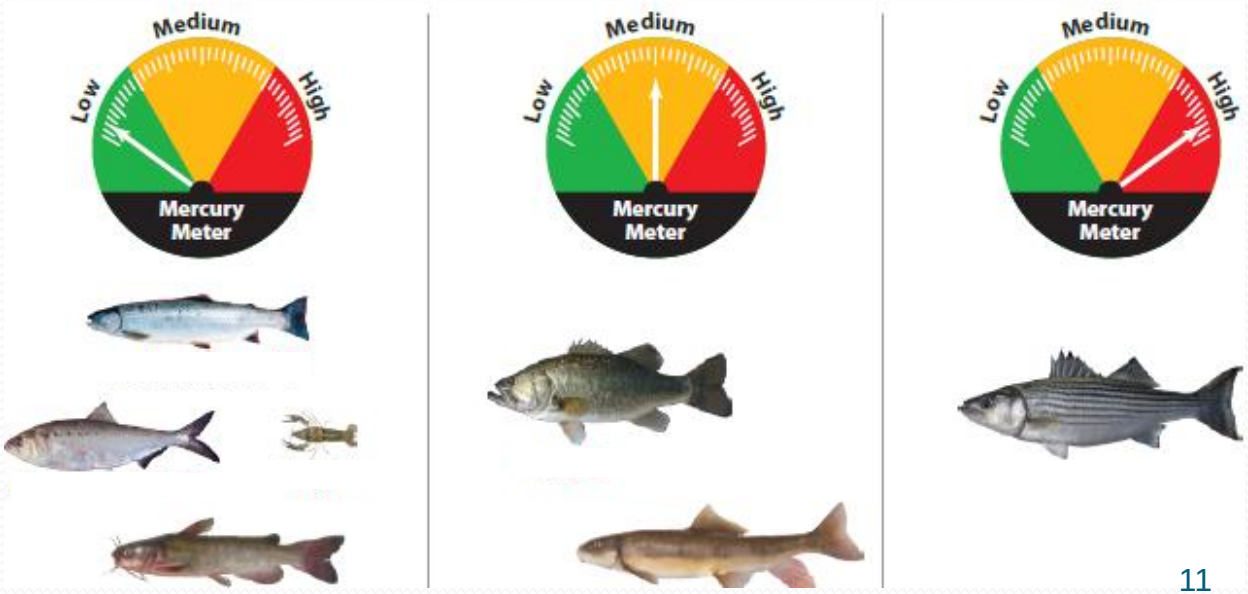
Delta & Yolo Bypass TMDL

- TMDL requirements for methylmercury & inorganic mercury sources
- Methylmercury control studies in Phase 1



Exposure Reduction Programs

- Response to Resolution 2005-0060
- San Francisco Bay and Delta Mercury TMDLs
- Goal: protect fish consumers
- Mercury and PCBs



Exposure Reduction

- Educational materials
- Pier signs
- Community-based projects
- Training & technical assistance
- Evaluation

Exposure Reduction Programs

- Funded by entities responsible for reducing loads
- SF Bay Program completed first “cycle” of activities
- Work plan for Delta activities due Oct. 2013
- Challenges
  - Funding & coordination
  - Dept. of Public Health resources

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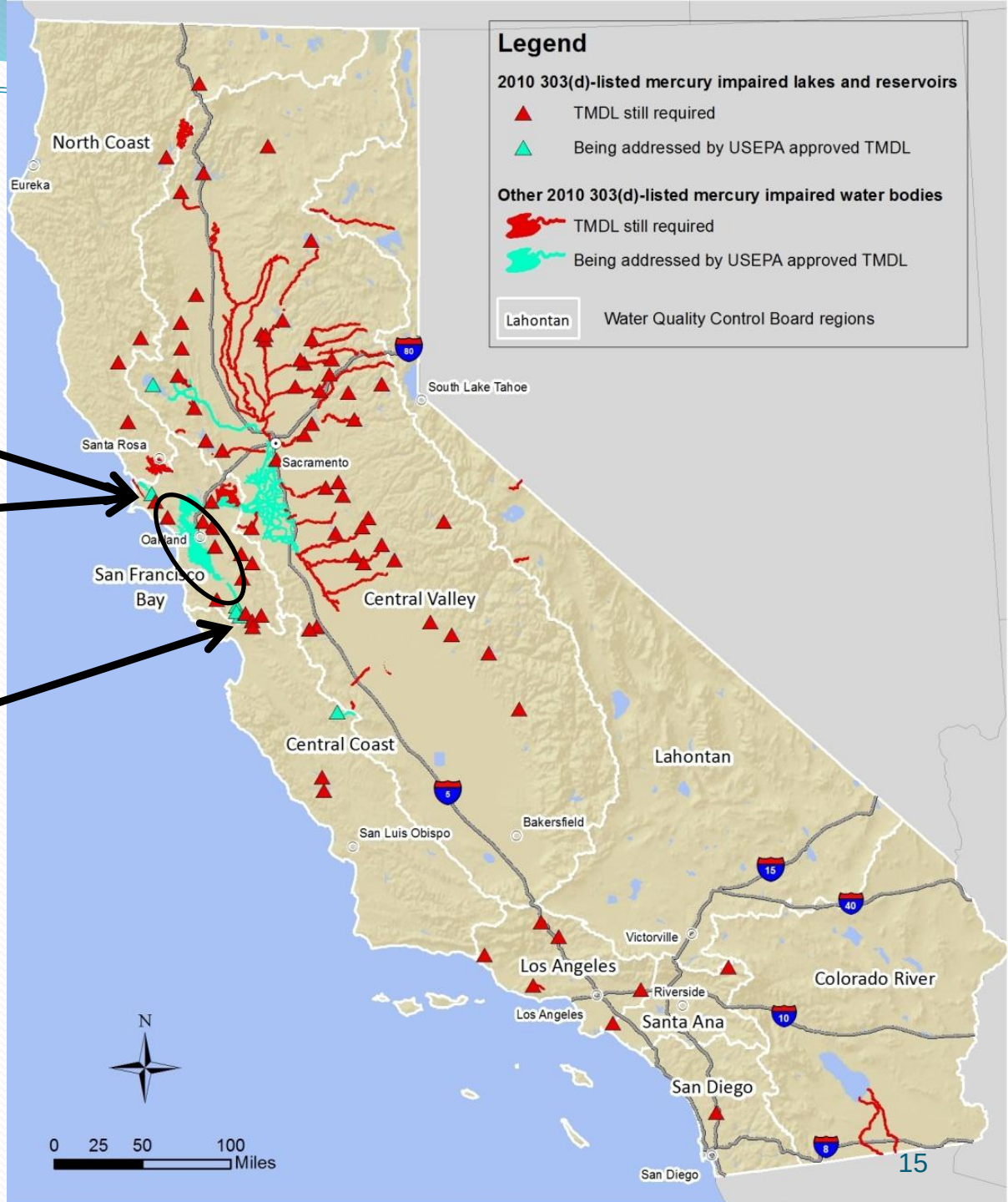
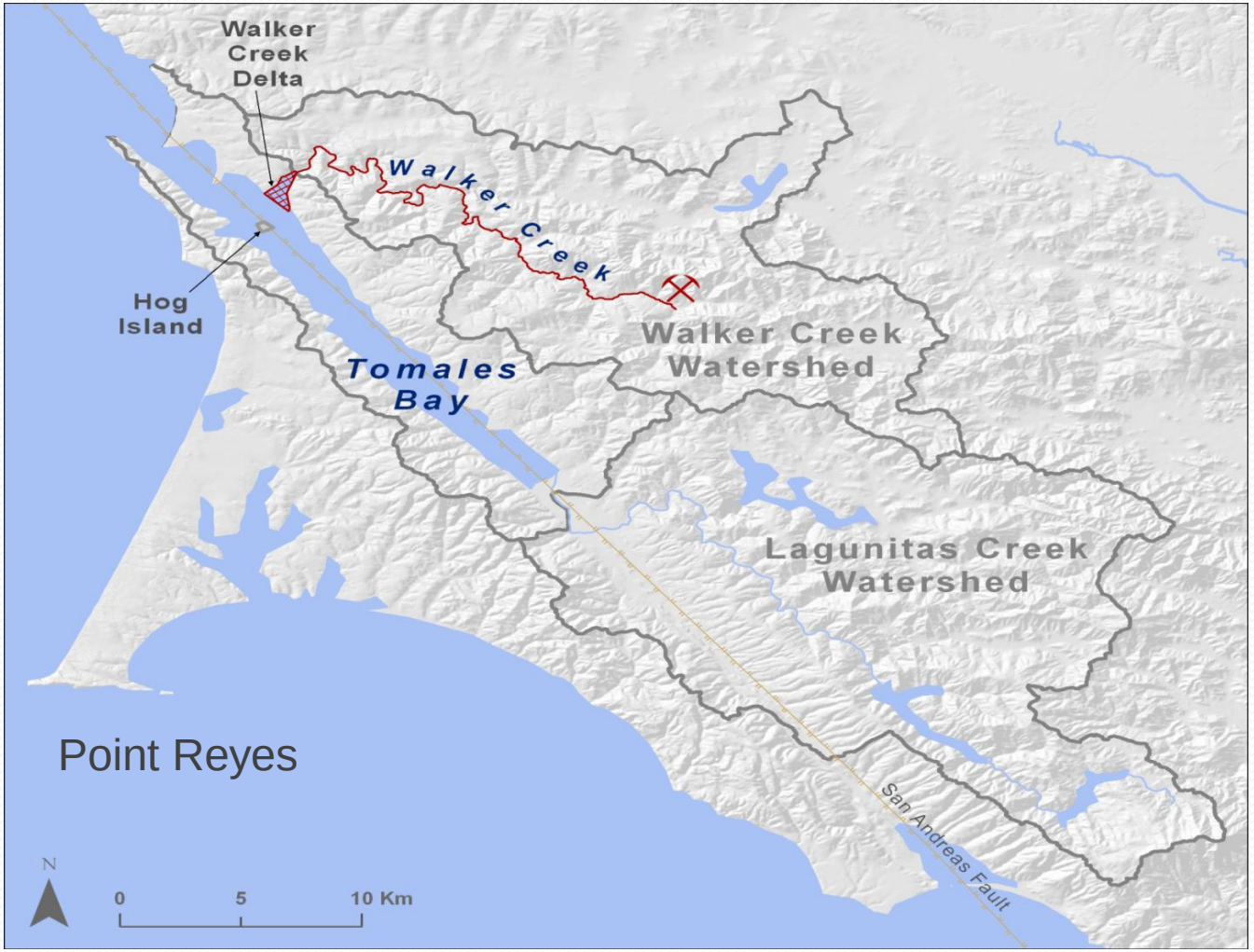
RB2 Mercury TMDLs

Tomales Bay	2012
Walker Creek	2007
SF Bay	2006
Guadalupe River	2008

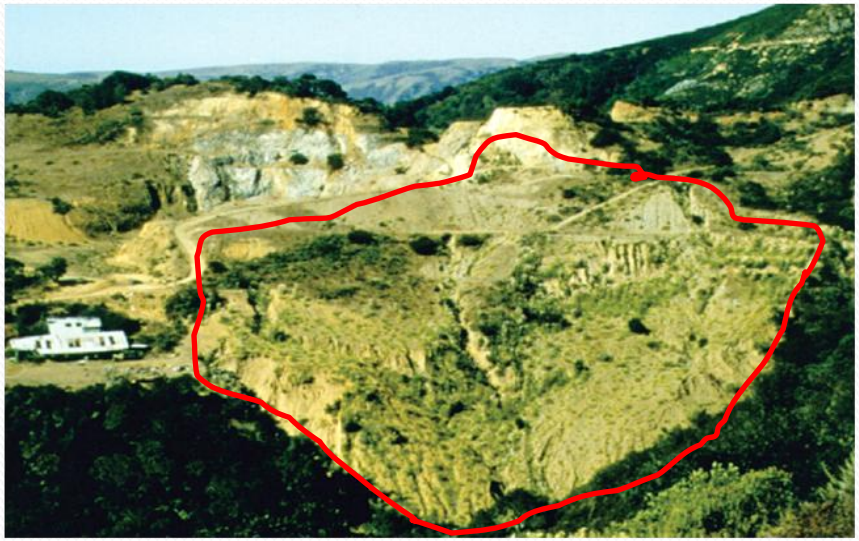
Currently, 14 additional water bodies on 303(d) list



Tomales Bay and Walker Creek Mercury TMDLs



Tomales Bay and Walker Creek Mercury TMDLs



Before

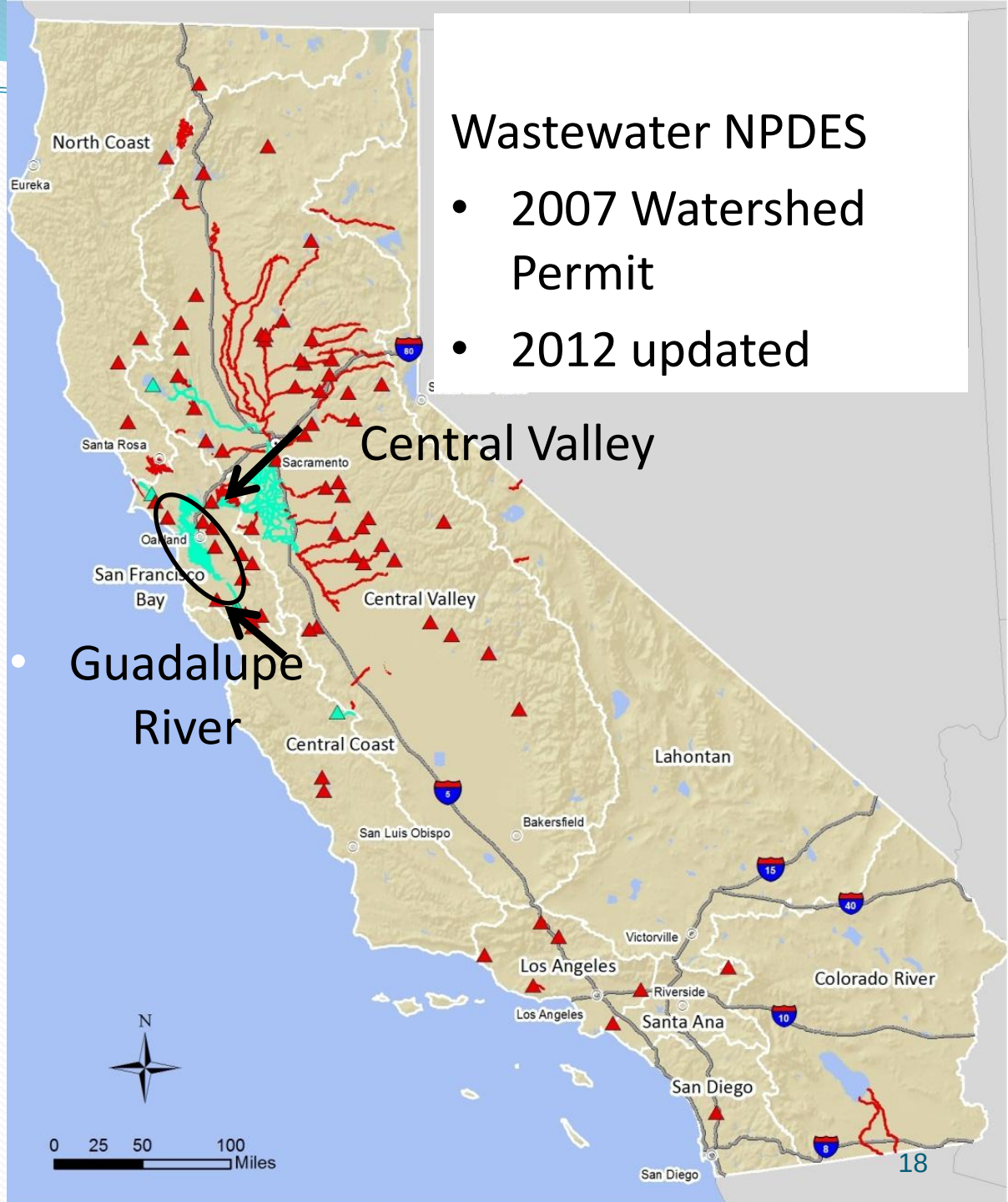
After

Gambonini Mercury Mine

San Francisco Bay

Examples and studies:

- Dental amalgam separators >85%
- Household hazardous waste

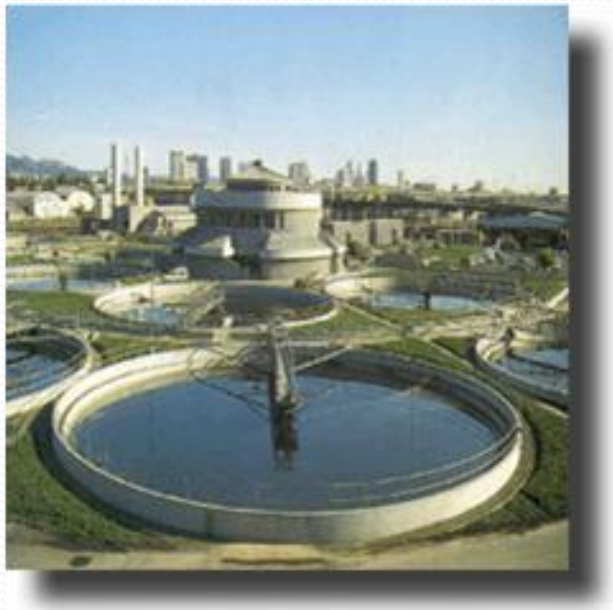


San Francisco Bay

Examples and studies:

Stormwater:
PCBs and mercury
pilot projects

Methylmercury studies



San Leandro Bay, alamedainfo.com

Guadalupe Implementation Starts at the Top

•Mine Hill ca. 1870
From: History San Jose website

•Mine Hill 2008
From: Google Earth

Leaders in Innovation: Water Chemistry

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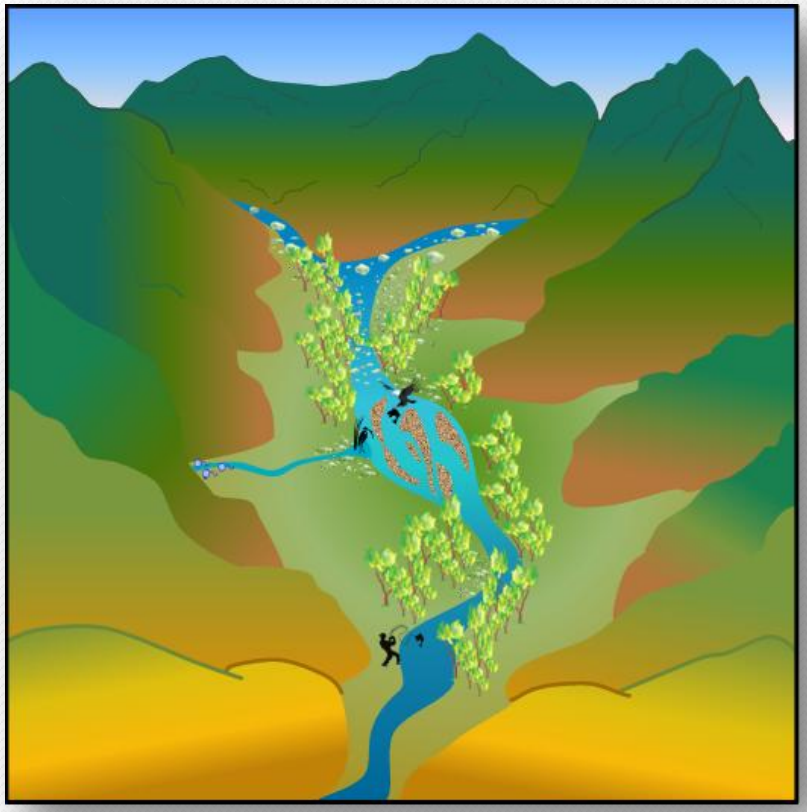
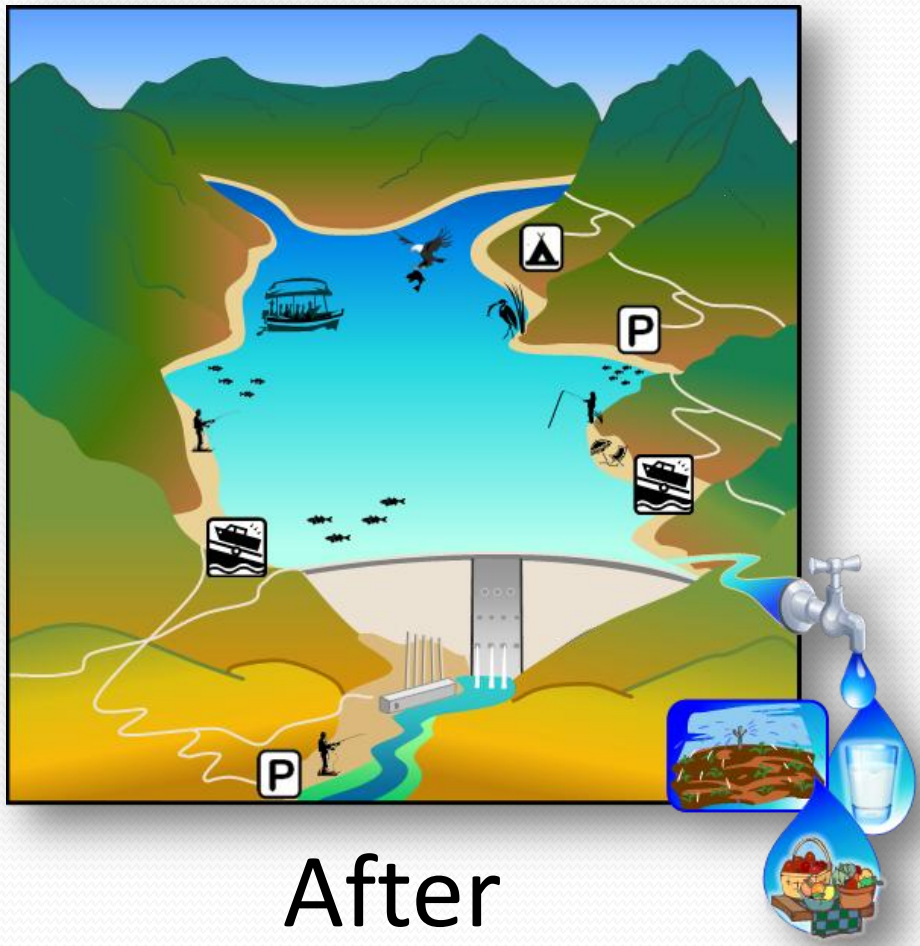
Building a Reservoir



Before



After

Reservoirs: Multiple Factors Contribute to Impairment

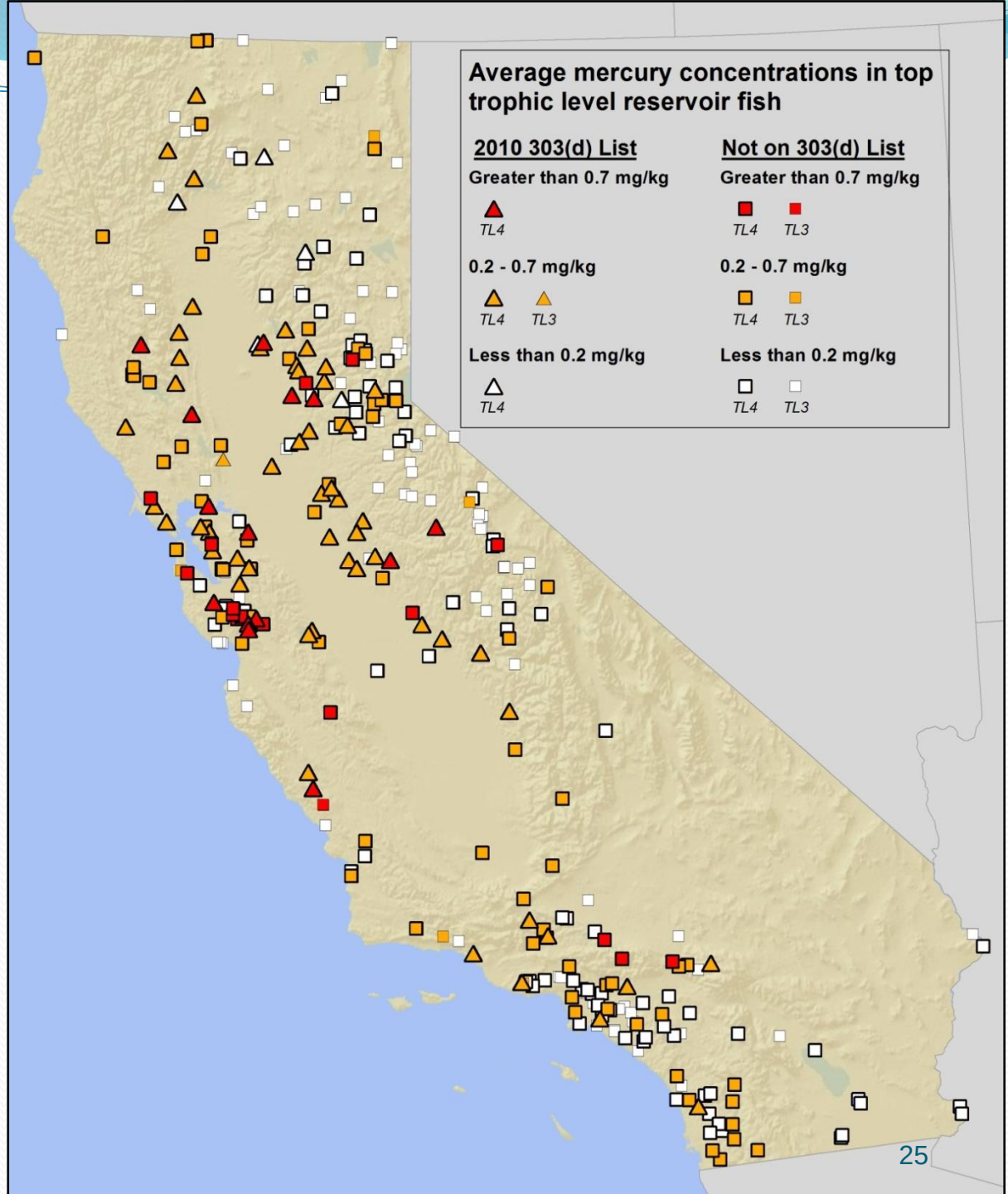
- Linkage from sources to mercury in fish

  sources → methylation → bioaccumulation

- Several tools
  - Select right tool(s) for each reservoir

Reservoir Fish Tissue Mercury Levels

- 74 listed reservoirs (this project)
- another ~ 75 likely soon to be listed
- Estimate ~50% of 1,000 – 1,400 CA reservoirs impaired



Potential Solutions to Reduce Fish Mercury

- Source control

- Water chemistry (decrease methylation)

- Fisheries management

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Background: Current Mercury Limits

California Toxics Rule, 2000

- Aqueous Mercury Criteria
- Not updated with EPA's 2001 guidance
  - Fish tissue criterion
- Not protective of wildlife

Need new water quality objective

Developing a Methylmercury Fish Tissue Objective

- "Fish tissue" objective
- Methylmercury: very toxic form of mercury
- Objective option: Similar to adopted site-specific objectives in San Francisco Bay and Delta TMDLs
  - 1 fish meal a week

Developing a Small Fish Methylmercury Fish Tissue Objective

- Protect California least tern, an endangered bird
- Already adopted in Delta and San Francisco Bay TMDLs

Rinus Baak, U.S. Fish and Wildlife Service

Sightings: California Natural Diversity Database (CNDDB): http://www.dfg.ca.gov/biogeodata/cnddb/ (accessed 09/2012)
Habitat: US Fish and Wildlife Service species profiles: http://www.fws.gov/species/#endangered (accessed 09/2012)

Developing an Implementation Plan

- Apply to inland surface waters, enclosed bays and estuaries
  - Except where existing TMDL site-specific objectives and implementation plans
- Coordinated with Control Program for Mercury Impaired Reservoirs
- Utilize existing programs

For People Dependent on Fish

Statewide Beneficial Use Definitions:

1. Native American Culture
2. Subsistence Fishing

- Already in Region 1 Basin Plan
- Defining, not designating to water bodies

Tribal Fish Consumption Study

- Study contract: UC Davis
  - Survey: which fish? where? how much?
  - About 20 tribes interested
  - Developing survey methods
- Study will not be complete before the Board considers objectives for adoption
- Reopener: to incorporate study results

Overall Project Schedule

Statewide Control Program for Mercury Impaired Reservoirs

CEQA scoping	**March 2012**
Proposal Development	***Ongoing***
Stakeholder Outreach	***Ongoing***
Scientific Peer Review	**Winter 2013/2014**
State Water Board public workshop	**Summer 2014**
State Water Board adoption hearing	**2015**

Statewide Mercury Fish Tissue Objectives Project

CEQA Scoping	**February 2007**
Proposal Development	***Ongoing***
Stakeholder Outreach	***Ongoing***
Scientific Peer Review	**Fall 2013**
State Water Board public workshop	**Summer 2014**
State Water Board adoption hearing	**2015**

Find Out More, Stay in Touch!

- Project web page:

  www.waterboards.ca.gov/water_issues/programs/mercury

- Sign up for email notices at:

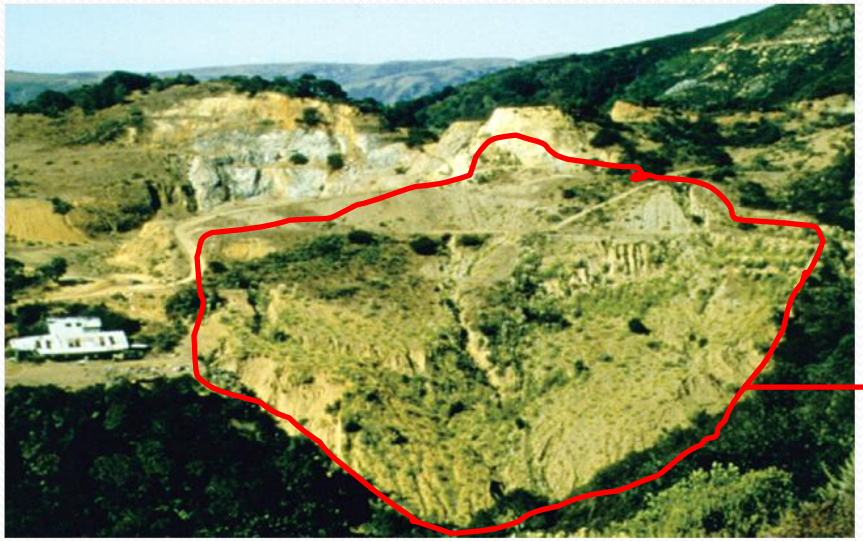
  www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.shtml#quality

- Email: MercuryProject@waterboards.ca.gov

Multiple Factors Contribute to Impairment

- Linkage from sources to mercury in fish
  - >30 variables from peer-reviewed literature evaluated
  - Comes down to 3 factors
    - TotHg = **sources**
    - MeHg/Chl-a = **methylation/bioaccumulation**
    - Reservoir fluctuation = **methylation/bioaccumulation**
- Not a one-size-fits-all solution

Tomales Bay and Walker Creek Mercury TMDLs



ENVIRONMENTAL Science & Technology

ARTICLE

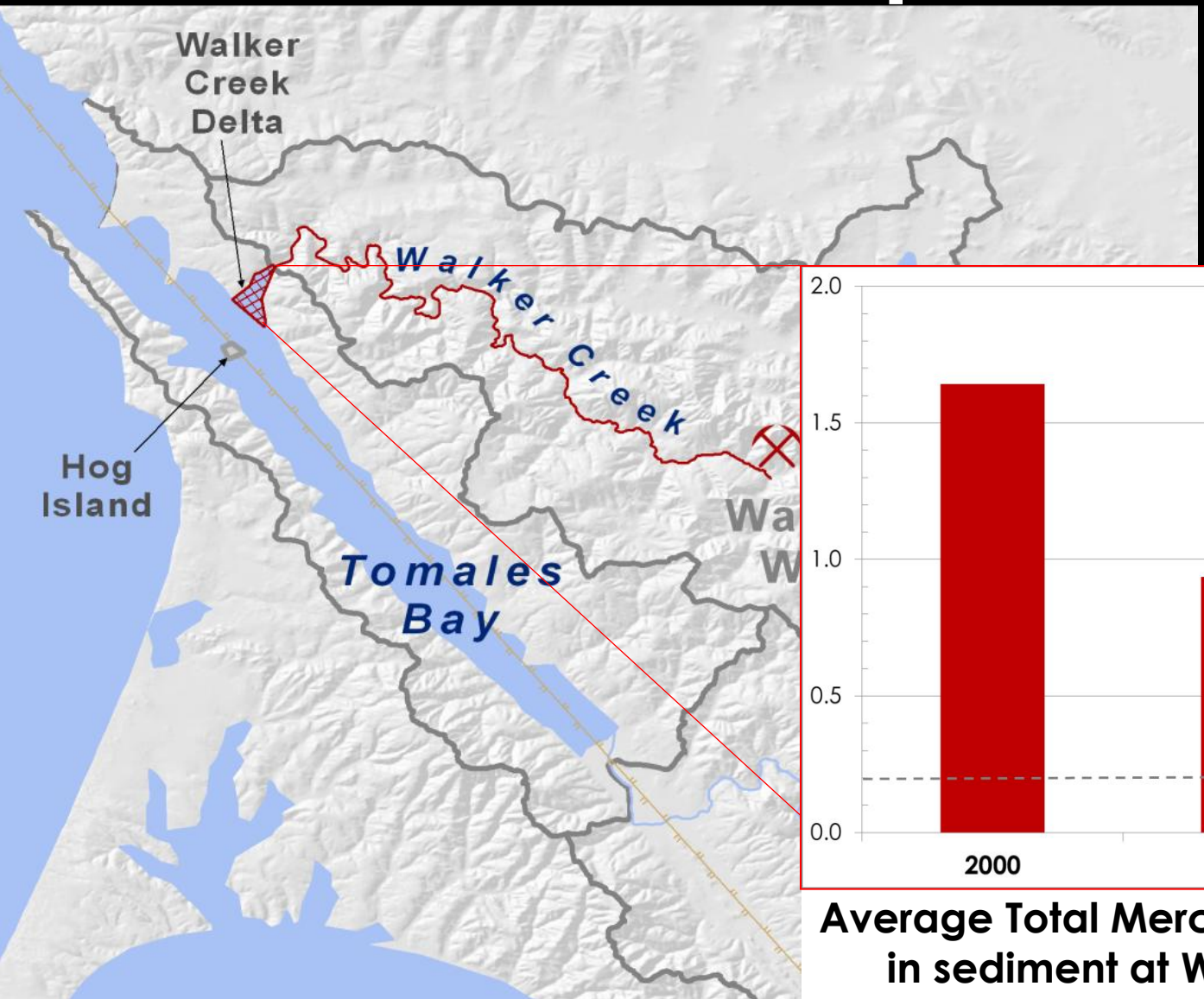
pubs.acs.org/est

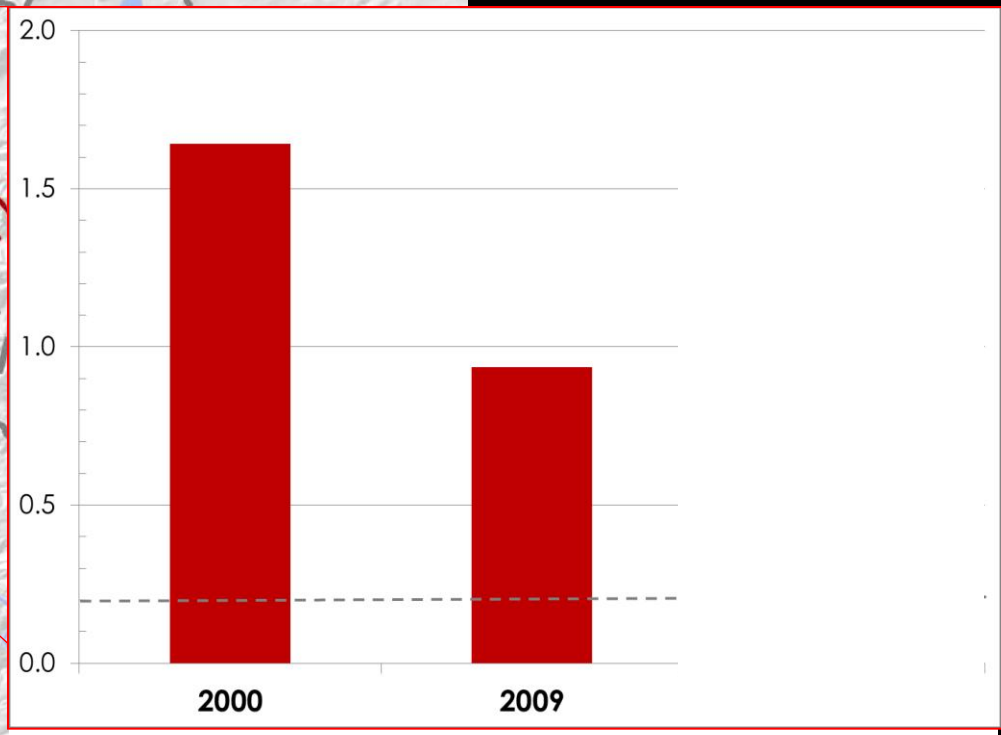
Quantifying Remediation Effectiveness under Variable External Forcing Using Contaminant Rating Curves

James W. Kirchner,[*,†,‡] Carrie M. Austin,[§] Alexandra Myers,[§,∥] and Dyan C. Whyte[§]

Environmental Science and Technology 2011, 45, 7874—7881

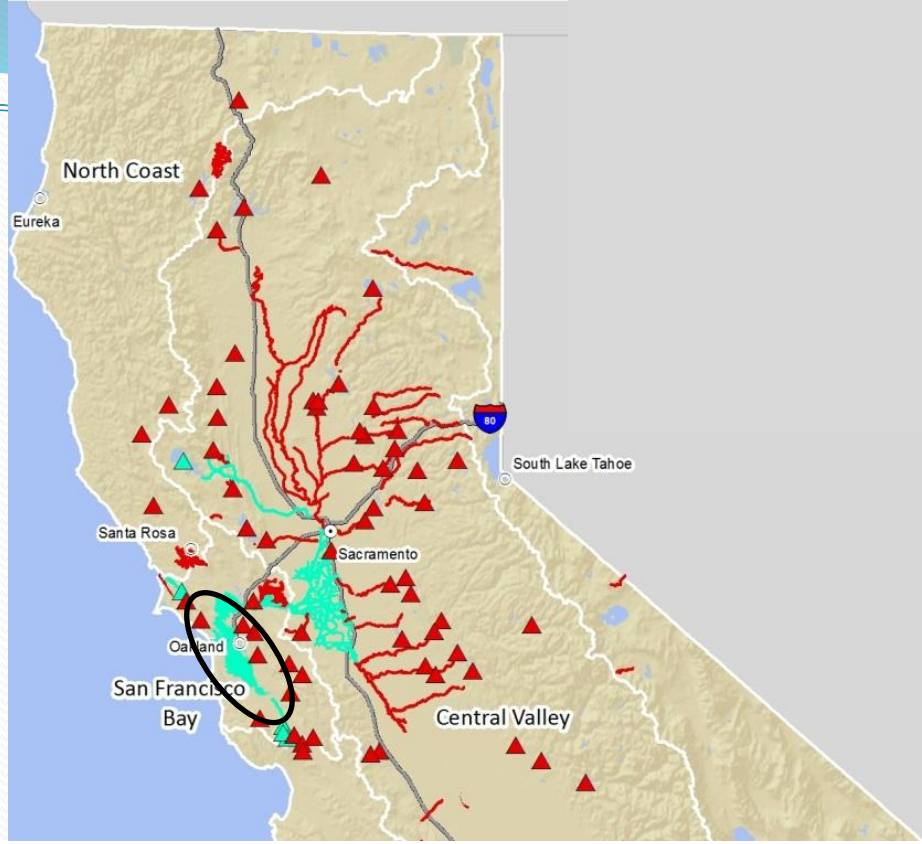
Tomales Bay
Measured Improvement





Average Total Mercury (parts per million) in sediment at Walker Creek Delta

San Francisco Bay



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Reducing methylmercury accumulation in the food webs of San Francisco Bay and its local watersheds

J.A. Davis [a,*], R.E. Looker [b], D. Yee [a], M. Marvin-Di Pasquale [c], J.L. Grenier [a], C.M. Austin [b], L.J. McKee [a], B.K. Greenfield [a], R. Brodberg [d], J.D. Blum [e]